

PATENT ABSTRACTS OF JAPAN

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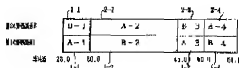
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(54) OPTICAL RECORDING MEDIUM AND APPARATUS FOR REPRODUCING IT

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent an optical disc supplying software or music data from being copied while hardly increasing the cost of the optical disc.

SOLUTION: A digital signal data A or B representing one data of an image, music, a program, etc., is divided in two or more by a unit smaller than the recordable amount of data of one data-recording face. The data are recorded separately to two or more different data-recording faces, so that the data recorded to the data-recording faces are discontinuous. The data A and the data B are recorded to one data-recording face fragmentarily in a mixed state. Even when data-recording faces of an optical disc are totally copied, the data A and B are fragmentarily mixed and any of the data A and B forms a meaningless disc not fulfilling one complete single data. Accordingly, illegal copying can be prevented.



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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] In the optical recording medium which has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction The digital signal data showing the information for one are divided or more into two in a unit smaller than the amount of data recordable on the 1st page of said information recording surface. The optical recording medium characterized by dividing and recording this divided digital signal data on a different information recording surface of the 2nd [or more] page as the information recorded on each information recording surface becomes discontinuous.

[Claim 2] In the optical recording medium which has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as said image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction The optical recording medium characterized by having divided into the key information for determining the decryption approach of the main data which enciphered said digital signal data and generated said information, and this main data, and recording this main data and key information on a different information recording surface.

[Claim 3] The optical recording medium characterized by recording said key information on a lead-in groove field in an optical recording medium according to claim 2.

[Claim 4] It has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction. The digital signal data showing the information for one are divided or more into two in a unit smaller than the amount of data recordable on the 1st page of said information recording surface. While it is divided and recorded on a different information recording surface of the 2nd [or more] page that the information recorded on each information recording surface becomes discontinuous, this divided digital signal data It is the regenerative apparatus of the optical recording medium

with which the record positional information of said digital signal data divided and recorded was recorded on the location defined beforehand. The regenerative apparatus of the optical recording medium characterized by reading the digital signal data divided and recorded on said different information recording surface of the 2nd [or more] page according to said record positional information, restoring to the original digital signal data, and reproducing said information.

[Claim 5] It has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction. It divides into the key information for determining the decryption approach of the main data which enciphered said digital signal data and generated said information, and this main data. It is the regenerative apparatus of the optical recording medium recorded on the information recording surface from which this main data and key information differ. After reading said key information and determining the decryption approach, said main data currently recorded on a different information recording surface from this key information are read. The regenerative apparatus of the optical recording medium characterized by restoring said main data to the original digital signal data based on said determined decryption approach, and reproducing said information.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the optical recording medium which the recorded information cannot copy to other media easily, and its regenerative apparatus.

[0002]

[Description of the Prior Art] The write once optical disk which can record data only once on mold optical disks only for playbacks, such as CD-ROM which recorded conventionally CD in which music information was mentioned, program software or a database, etc., and an optical disk, and a rewriting mold optical disk rewritable any number of times exist. And it can perform very easily reading the data recorded on the mold optical disk only for playbacks, for example, recording the data on a write once optical disk. However, the approach of protecting from a copy music, program software or a database recorded on the mold optical disk only for playbacks is hardly taken now. For this reason, the actual condition is that the illegal copy to CD and CD-ROM of an original copy is also performed simply.

[0003] So, by a part of [expensive] software, there were some which have taken the measures which carry out attaching the addition to the exterior of a hardware key and the special data disk for the anti-copying called a key disk etc., and prevent an illegal copy.

[0004]

[Problem(s) to be Solved by the Invention] By the way, since the above hardware keys, the medium which supplies software by the prevention approach of an illegal copy using a key disk,

and the hardware key for anti-copying and a key disk are needed, as for the burden to a registered user, it is large that the cost of software becomes high and utilization of software becomes impossible by the hardware key, breakage on a key disk, disappearance, etc.

[0005] Moreover, in recent years, there is an optical disk to which inclusion capacity was made to increase by preparing the 2nd [or more] page of the information recording surface for recording information in the thickness direction of an optical disk. Although anti-copying to an illegal copy is similarly performed in such an optical disk, there is need.

[0006] Then, this invention is made paying attention to the above-mentioned point, and it aims at performing anti-copying, without making almost the cost rise of the optical disk which supplies software and music information.

[0007]

[Means for Solving the Problem] "As a means for this invention to attain the above-mentioned object In the optical recording medium which has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction The digital signal data showing the information for one are divided or more into two in a unit smaller than the amount of data recordable on the 1st page of said information recording surface. It is going to offer the optical recording medium characterized by dividing and recording this divided digital signal data on a different information recording surface of the 2nd [or more] page as the information recorded on each information recording surface becomes discontinuous." moreover -- as a means for this invention to attain the above-mentioned object --
"-- said image -- In the optical recording medium which has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as music and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction It is going to divide into the key information for determining the decryption approach of the main data which enciphered said digital signal data and generated said information, and this main data, and is going to offer the optical recording medium characterized by recording this main data and key information on a different information recording surface."

[0008]

[Embodiment of the Invention] Hereafter, one example of this invention is explained with reference to an accompanying drawing. In addition, in order to simplify explanation here, the optical disk which has two information recording surfaces is used in the thickness direction of an optical disk, and the case where record playback of two digital signal data (for example, software) named A and B is performed is explained. Moreover, each of Data A and B shall be digital signal data showing information for one, such as an image, music, and a program, and shall be the amount of data which the amount of data can record on the data storage area of the information recording surface of the 1st page.

[0009] First, an example of the optical disk used by this invention is explained. Drawing 1 is drawing showing an example of the structure of the optical disk of this invention. As shown in

this drawing, the optical disk used by this invention has the information recording surface of the 2nd [or more] page in the thickness direction of an optical disk (this drawing shows the example which has the 2nd page of an information recording surface). In the optical disk 10 shown in this drawing, it has the structure where the laminating of the light transmission nature substrate 11, the 1st reflecting layer 12, a clear layer 13, the 2nd reflecting layer 14, and the protective layer 15 was carried out one by one. And on the light transmission nature substrate 11, signal pit 11A used as the 1st information recording surface 1 is formed, and signal pit 13A used as the 2nd information recording surface 2 is formed on the clear layer 13. Moreover, the 1st reflecting layer 12 consists of ingredients which have the light transmittance which is extent which exists so that the incidence of the light to the 2nd information recording surface 2 and an echo can be performed. Therefore, it is constituted so that the information recorded on the 1st information recording surface 1 and the 2nd information recording surface 2 can be read by changing the focal location of the laser beam irradiated from a substrate 11 side.

[0010] Next, the 1st example of this invention is explained. Drawing 2 is drawing for explaining the signal record approach of the 1st example of this invention. The axis of abscissa shows that the radius of an optical disk is shown and a record section is located in the range of 23-58mm radius in this example in this drawing. Moreover, the lengthwise direction shows two information recording surfaces. As shown in this drawing, in this example, the digital signal data (it is only hereafter indicated as data) A and B showing the information for one are divided or more into two in a unit smaller than the amount of data recordable on the 1st page of an information recording surface, and it divides and records that the information currently recorded on each information recording surface becomes discontinuous on a different information recording surface of the 2nd [or more] page. Therefore, Data A and Data B will be intermingled in one information recording surface in fragments, and will be recorded on it. In this drawing Data A The radius of 23-30mm (record section 1-1) of the 1st information recording surface, It is divided and recorded on the radius of 30-45mm (record section 2-2) of the 2nd information recording surface, the radius of 45-50mm (record section 1-3) of the 1st information recording surface, and the radius of 50-58mm (record section 2-4) of the 2nd information recording surface by A-1, A-2, A-3, and A-4. Software B Moreover, the radius of 23-30mm (record section 2-1) of the 2nd information recording surface, It is divided and recorded on the radius of 30-45mm (record section 1-2) of the 1st information recording surface, the radius of 45-50mm (record section 2-3) of the 2nd information recording surface, and the radius of 50-58mm (record section 1-4) of the 1st information recording surface by B-1, B-2, B-3, and B-4. TOC of for example, the disk most inner circumference, the memory of a regenerative apparatus, etc. record the record positional information (radius information and address information) on which these data A and B are recorded on the position defined beforehand.

[0011] Here, in the former, when two data A and B which are different from each other were recorded on the optical disk which has two information recording surfaces, as shown in drawing 3 , the 1st information recording surface 1 was followed in Data A (or B), the 2nd information recording surface 2 was followed in Data B (or A), and it was recording. However, if each

information recording surface is copied to other media the whole round head by such record approach, respectively, it is refreshable in Data A and Data B by the medium. however, even if it copied each information recording surface of the optical disk of this example the whole round head, Data A and B were intermingled in fragments -- moreover -- A and B -- since the meaningless thing which cannot complete single software anyway will be produced, the illegal copy can be prevented.

[0012] Next, the regenerative apparatus of the optical disk which recorded the signal like the 1st example of the above is explained. Drawing 4 is drawing showing roughly the configuration of the important section of the regenerative apparatus of the optical disk shown in drawing 2 . In this drawing, 10 is the above-mentioned optical disk 10, has two information recording surfaces 1 and 2 in the thickness direction, and has intermingled for them and recorded them on each of each information recording surface in the data A and B divided as mentioned above.

[0013] Moreover, reading appearance of the information recorded on the optical disk 10 is optically carried out by the optical pickup 21, and it is changed into electrical signals, such as a regenerative signal and a servo signal, through the head amplifier circuit 22 by it. These electrical signals are sent to a digital disposal circuit 23, and are changed and outputted to digital data. In addition, playback of each information recording surface in an optical disk 10 is performed by the well-known focusing technique. That is, since each information recording surface separates fixed spacing and is arranged at parallel, the focus from which tracking will be acquired if an optical pickup 21 is moved up and down is acquired only for the number of information recording surfaces. Thus, by control of pickup 21, it is possible to double a focus to the information recording surface decided beforehand, and playback can be performed to it without difficulty.

[0014] If an optical disk 10 is set in the above-mentioned regenerative apparatus 20, the disk set detector 24 will send a disk detecting signal to a microcomputer 25. The carrier beam microcomputer 25 rotates an optical disk 10 for a disk detecting signal using the disk actuator 27, the optical pickup actuator 26 is controlled further, and TOC on an optical disk 10 (Table Of Contents) is first reproduced using an optical pickup 21. In addition to time code information etc., Data A and B are divided into TOC how, the record positional information which shows where it is recorded is recorded, and it stores in memory 25A which prepared the record positional information reproduced from TOC in the interior of a microcomputer 25 (or exterior). And a microcomputer 25 outputs an optical pickup control signal to the optical pickup actuator 26 based on record positional information. Based on the optical pickup control signal from a microcomputer 25, the change of the seeking [of an optical pickup 21] and 1st, or 2nd information recording surface is controlled by the optical pickup actuator 26. That is, when reproducing Data A, A-1 recorded on the above-mentioned record section 1-1 considering the focal location of laser beam L as 1st information recording surface 1 is reproduced first. And if it becomes a location with a radius of 30mm, A-2 recorded on the above-mentioned record section 2-2 considering the focal location of laser beam L as 2nd information recording surface 2 will be reproduced. Hereafter, A-3 is similarly reproduced for a focal location as 1st information

recording surface 1 in a location with a radius of 45mm, and A-4 is reproduced for a focal location as 2nd information recording surface 2 in a location with a radius of 50mm.

[0015] Next, the effectiveness of this example is explained supposing a concrete duplicate means. In addition, in the following explanation, it assumes being copied to the monolayer disk (optical disk with which only the 1st page has the information recording surface) of two or more sheets.

a. It is possible to read a certain specific information recording surface continuously in the case usual regenerative apparatus of the duplication method using a usual regenerative apparatus and a usual recording device. If it sees in the example of drawing 2, the 1st information recording surface 1 and the 2nd information recording surface 2 will be read in order, and if the duplicate disk of two sheets is produced with a recording apparatus, the optical disk of a monolayer with which the 1st information recording surface 1 was recorded, and the optical disk of a monolayer with which the 2nd information recording surface was recorded will be obtained. When it is going to play the duplicate disk of these two sheets with the regenerative apparatus 20 of drawing 4, when it is going to move to the 2nd information recording surface 2 from the 1st information recording surface 1 based on TOC, an error arises, and normal playback cannot be performed. Moreover, a certain modification is performed at the regenerative apparatus of drawing 4, and since it is intermingled in fragments in Data A and B when continuation playback tended to be carried out without the change of an information recording surface, or also when using the usual continuation playback player, perfect playback of data cannot be performed. Thus, since it becomes the meaningless disk which cannot perform perfect restoration even if a duplicate disk is made, prevention of an illegal copy can be performed.

[0016] b. In the case of the duplication method which copies the signal configuration of a disk the whole round head physically, a regenerative apparatus is not used, but there is the approach of carrying out the physical imprint of the signal configuration minced by the disk front face as it is. It dissolves the protective coat (ultraviolet-rays hardening resin) and reflective film (aluminum) of a disk with the solution of a strong base, and it begins from exposing the front face where the signal was minced. If a signal side is exposed, a stamper can be made by the well-known approach of electric-conduction-izing by the metal thin film, and electrocasting. It cannot be overemphasized that a disk can produce so much from the stamper. Except the 1st information recording surface (signal plane which is united with the substrate) which was made by injection molding in the case of the optical disk of multilayer structure as shown in drawing 1, the case currently made from ultraviolet-rays hardening resin is most, and will also dissolve them together in the phase of the above-mentioned dissolution processing. However, there is a possibility that a duplicate may be made, about the 1st information recording surface which remained. Since another software is intermingled to the main data of the 1st information recording surface in this invention and it becomes the meaningless disk whose restoration is impossible even if La Stampa and a disk are made, prevention of an illegal copy can be performed.

[0017] Next, the 2nd example of this invention is explained. Drawing 5 is drawing for explaining the signal record approach of the 2nd example of this invention. As shown in this drawing, in

this example, the point which each of the data A and B which should be recorded is enciphered based on the key information A and B corresponding to each, and is recorded on each information recording surface on an optical disk differs from the above-mentioned optical disk 10. That is, when [this] dividing and recording on the main data and key information which were enciphered and generated based on key information, the data which should be recorded record the key information A on Data A on the data storage area 1-2 of the 1st information recording surface 1, and record the main data B1 which enciphered and generated Data B on a data storage area 1-1. Moreover, key information B-2 is similarly recorded on the data storage area 2-2 of the 2nd information recording surface 2, and the main data A1 are recorded on a data storage area 2-1. That is, the key information and the main data of the same origin are made not to be recorded on the same information recording surface. As long as it keeps this principle, also in an optical disk which has the 3rd [or more] page of an information recording surface, key information and the main data may be installed in the radius of arbitration that what is necessary is just to arrange to the information recording surface of arbitration. Moreover, it is also possible for neither key information nor the main data to necessarily continue uniformly, for example, to halve key information B-2 to B-2 -1 and B-2 -2, to record the radius of 40.0-40.5mm and key information B-2 -2 for key information B-2 -1 on the radius of 57.5-58.0mm, and to use except [its] as the main data A.

[0018] The main data A1 and B1 of the above-mentioned data A and B and the key information A2, and B-2 are recorded with the recording device 40 as shown in drawing 6 . In this drawing, 41 is an encryption means 41 to encipher Data A and B based on key information, 42 is the master data record means 42 for recording the main data A1 and B1 which enciphered Data A and B with the encryption means 41, and were generated on the information recording surface of an optical disk, and 43 is the key information record means 43 for recording the above-mentioned key information A2 and B-2.

[0019] Next, actuation of the above-mentioned recording device 40 is explained. If the data (digital signal data which are recorded on the conventional optical disk) A and B, such as music information and a program, are inputted into the encryption means 41, with the encryption means 41, Data A and B will be enciphered using the key information A2 or B-2 corresponding to each of Data A and B. As the approach of this encryption, data are divided into an every several bits group, and what shifts each several bits bit at a time to the right or the left within that group can be considered, for example. moreover, dividing Data A and B into an every several bits group, and setting beforehand the encryption regulation for encryption of shifting each several bits bit at a time to the right or the left within that group to the encryption means 41 among this encryption approach, and making a what bit group divide using key information -- or the constant-information what bit shift is carried out is given.

[0020] Thus, with the encryption means 41, Data A and B are enciphered using the key information A2 and B-2, the main data A1 and B1 are generated, and it outputs to the master data record means 42. With a master data record means 42 by which these main data A1 and B1 were inputted, it records similarly with recording data on the conventional optical disk. At this

time, the main data A1 are recorded on the data storage area 2-1 of the 2nd information recording surface 2, and record the main data B1 on the data storage area 1-1 of the 1st information recording surface 1. Moreover, the above-mentioned key information A2 and B-2 are inputted also into the key information record means 43 with the encryption means 41. With this key information record means 43, the key information A2 is recorded on the key information record section 1-2 of the 1st information recording surface 1, and key information B-2 is recorded on the key information record section 2-2 of the 2nd information recording surface 2.

[0021] It becomes possible to produce the optical disk with which the main data enciphered based on key information and key information as mentioned above were recorded. Thus, the created optical disk cannot generate Data A and B from the main data A1 and B1, if the encryption approach from Data A and B to the original main data A1 and B1 is not decoded. In addition, since it becomes difficult to decode the decryption approach so that the encryption approach is complicated, of course, the effectiveness of protecting the recorded data from a vicious illegal copy becomes high.

[0022] Next, the regenerative apparatus of the optical disk which recorded the signal like the 2nd example of the above is explained. Drawing 7 is drawing showing roughly the configuration of the important section of the regenerative apparatus of the optical disk shown in drawing 5. The main data read means 51 for a regenerative apparatus 50 to read the above-mentioned main data A1 and B1 in the data storage area of an optical disk, as shown in this drawing, It consists of RAM54 which stores the decryption approach determined as the key information read means 52 for reading the above-mentioned key information A2 and B-2 in a key information record section, and the key information A2 and a decryption means 53 to decrypt the main data A1 and B1 based on B-2, and to reproduce the above-mentioned data A and B. And Data A are restored from the key information A2 recorded on the main data A1 and the 1st information recording surface 1 which were recorded on the 2nd information recording surface 2, and Data B are restored from key information B-2 recorded on the main data B1 and the 2nd information recording surface 2 which were recorded on the 1st information recording surface 1.

[0023] Next, actuation of a regenerative apparatus 50 is explained. First, the key information A2 and B-2 which were recorded on the optical disk are read by the key information read means 52, and are outputted to the decryption means 53. the key information A2 and a decryption means 53 by which B-2 was inputted -- first -- the key information A2 and B-2 -- Data A and B -- it is alike, respectively and the corresponding decryption approach is determined. Here, the decryption regulation for decoding each of the main data A1 and B1 by which encryption was carried out [above-mentioned] is set to the decryption means 53. It divides for example, the main data into a group, and seems to say that it shifts b bits of each bit in the group at a time to c (right or left). The decryption approach is determined by applying $a=4$, $b=1$, and $c=$ right to this decryption regulation using the key information by which the input was carried out [above-mentioned]. And the decryption approach is determined about each of the main data A1 and B1, and it stores in RAM54 as the decryption approach of the main data A1 or the main data B1.

[0024] Next, if the decryption approach is determined by the decryption means 53, by the main data read means 51, the main data A1 recorded on the data storage area of an optical disk or B1 will be read, and this read main data will be outputted to the decryption means 53. With a decryption means 53 by which the main data were inputted, the main data inputted are decoded based on the decryption approach by which a decision was made [above-mentioned]. That is, when it decodes based on the decryption approach of the main data A1 stored in RAM54 when the main data A are read and the main data B are read, it decodes based on the decryption approach of the main data B1 stored in RAM54. Thus, it restores to the original data from the recorded main data, and outputs as a regenerative signal.

[0025] In addition, the facilities at the time of playback must be considered and it must record on somewhere in a disk about the record location of key information and the main data, i.e., the number of an information recording surface and the information on a record radius, independently. As for the location, it is desirable to put into the field to which pickup dies to read-out at the very beginning at the time of optical disk playback. For example, in multimedia CD and TypeII, it is the inner guard area (equivalent to a lead-in groove) of the inner circumference of the 1st information recording surface 1. Although there is TOC in this part and the inclusion time amount of each information recording surface, the program, the index, etc. are recorded, key information, the number of the information recording surface of the main data, and the information on a radius are recorded.

[0026] Since the key information which makes the decryption approach for decoding the main data which enciphered data, and the main data determine was recorded on a different information recording surface according to the optical disk of this example as explained above, an illegal copy can be prevented like the 1st example of the above.

[0027] Moreover, in the 2nd example of the above, various gestalten can be taken as a record location of key information. For example, key information may be recorded after TOC in lead-in groove area. In this case, key information consists of the same signal format as the main data, and performs record as well as the main data by mastering. The readout means of key information dies the key information on desired to reading succeedingly, after reading TOC by the optical pickup as well as the main data. It is the cheap copy protection approach of making record/playback means of the main data and key information serve a double purpose.

[0028] Moreover, you may make it record on a different radius for every information recording surface by making key information into a bar code, for example. The record approach of a bar code has the approach of making by the existence of a pit train at the time of mastering, the approach of printing on a disk in the print of the reflective film with the membrane formation mask by which punching was carried out, and ink, etc. Moreover, for example, one optical bar code reader is prepared in a regenerative apparatus, a desired location is accessed according to the positional information written in TOC, and key information is read. Since this approach performs key information and the main data with another readout means, it is a copy protection with high secrecy nature. In addition, optical bar code readers may be a magnetometric sensor and an electrostatic-capacity sensor. Moreover, you may make it include angle on which key

information is recorded although each information recording surface is recorded in the same radius change with information recording surfaces. For example, for the 1st information recording surface, the 10 - 50-degree and 2nd information recording surface is 60-100. A degree and the 3rd information recording surface are 110-150. The bar code used as key information is recorded on whenever. A bar code reader is round 360. After reading the signal for whenever, based on TOC information, the key information on a desired include angle is selected. In addition, the signal of include-angle criteria may be put in if needed. This approach has the advantage that a bar code reader is good at immobilization, and a device becomes easy.

[0029] Although the example has been given about the record location of key information above, as for this invention, it is needless to say that it is not limited to these and can combine with the existing disk duplicate prevention technique. Moreover, although above-mentioned explanation explained centering on the optical disk of multilayer structure, of course also in the optical disk of the lamination structure which the substrate in which the information recording surface was formed was made to rival, and constituted it, the partial ROM disk having the part only for playbacks, and a record part, and a rewritable mold optical disk, it can apply.

[0030]

[Effect of the Invention] In the optical recording medium which has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction according to the optical recording medium of this invention as explained above The digital signal data showing the information for one are divided or more into two in a unit smaller than the amount of data recordable on the 1st page of said information recording surface. Since this divided digital signal data was divided and recorded on a different information recording surface of the 2nd [or more] page as the information recorded on each information recording surface becomes discontinuous, effective high anti-copying of secrecy nature can be performed without making the cost rise of an optical recording medium almost.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing showing an example of the structure of the optical disk of this invention.

[Drawing 2] It is drawing for explaining the signal record approach of the 1st example of this invention.

[Drawing 3] It is drawing for explaining the signal record approach of the conventional optical disk.

[Drawing 4] It is drawing showing roughly the configuration of the important section of the regenerative apparatus of the optical disk shown in drawing 2 .

[Drawing 5] It is drawing for explaining the signal record approach of the 2nd example of this invention.

[Drawing 6] It is drawing showing roughly the configuration of the important section of the recording device of the optical disk shown in drawing 5 .

[Drawing 7] It is drawing showing roughly the configuration of the important section of the regenerative apparatus of the optical disk shown in drawing 5 .

[Description of Notations]

- 1 1st Information Recording Surface
- 2 2nd Information Recording Surface
- 10 Optical Disk (Optical Recording Medium)
- 11 Light Transmission Nature Substrate
- 11A, 13A Pit
- 12 1st Reflecting Layer
- 13 Clear Layer
- 14 2nd Reflecting Layer
- 20 50 Regenerative apparatus
- 40 Recording Device

CORRECTION OR AMENDMENT

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[Procedure amendment 1]

[Document to be Amended] Description

[Item(s) to be Amended] The name of invention

[Method of Amendment] Modification

[Proposed Amendment]

[Title of the Invention] The digital signal data-logging approach to an optical recording medium and an optical recording medium, and the regenerative apparatus of an optical recording medium

[Procedure amendment 2]

[Document to be Amended] Description

[Item(s) to be Amended] Claim

[Method of Amendment] Modification

[Proposed Amendment]

[Claim(s)]

[Claim 1] In the optical recording medium which has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction,

The optical recording medium characterized by dividing and recording the digital signal data showing the information for one on said different information recording surface of the 2nd [or more] page in a unit smaller than the amount of data recordable on the 1st page of said information recording surface as divide or more into two and this divided digital signal data becomes discontinuous on said information recording surface.

[Claim 2] In the optical recording medium which has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction,

The optical recording medium characterized by having divided into the key information for determining the decryption approach of the main data which enciphered and generated said digital signal data, and this main data, and dividing and recording said main data and said key information on said different information recording surface of the 2nd [or more] page.

[Claim 3] In an optical recording medium according to claim 2,

The optical recording medium characterized by recording said key information on the lead-in groove field of one of said information recording surfaces.

[Claim 4] In an optical recording medium according to claim 2 or 3,

For the 1st playback means which reproduces said main data, said key information is an optical recording medium characterized by what was recorded by refreshable signal aspect with the 2nd different playback means.

[Claim 5] In the digital signal data-logging approach to the optical recording medium which has

the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction,

The digital signal data-logging approach to the optical recording medium characterized by dividing and recording the digital signal data showing the information for one on said different information recording surface of the 2nd [or more] page in a unit smaller than the amount of data recordable on the 1st page of said information recording surface as divide or more into two and this divided digital signal data becomes discontinuous on said information recording surface.

[Claim 6] In the digital signal data-logging approach to the optical recording medium which has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction,

The digital signal data-logging approach to the optical recording medium characterized by dividing into the key information for determining the decryption approach of the main data which enciphered and generated said digital signal data, and this main data, and dividing and recording said main data and said key information on said different information recording surface of the 2nd [or more] page.

[Claim 7] In the digital signal data-logging approach to an optical recording medium according to claim 6,

The digital signal data-logging approach to the optical recording medium characterized by recording said key information on the lead-in groove field of one of said information recording surfaces.

[Claim 8] In the digital signal data-logging approach to an optical recording medium according to claim 6 or 7,

For the 1st playback means which reproduces said main data, said key information is the digital signal data-logging approach to the optical recording medium characterized by what is recorded by refreshable signal aspect with the 2nd different playback means.

[Claim 9] It has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction. And the digital signal data showing the information for one are divided or more into two in a unit smaller than the amount of data recordable on the 1st page of said information recording surface. While this divided digital signal data divides and records becoming discontinuous on said different information recording surface of the 2nd [or more] page on said information recording surface, it is the regenerative apparatus of the optical recording medium which recorded the record positional information of said digital signal data divided and recorded on the location defined beforehand, and it is
. The regenerative apparatus of the optical recording medium characterized by reading said digital signal data divided and recorded on said different information recording surface of the 2nd [or more] page according to said record positional information, restoring to the original digital signal data, and reproducing.

[Claim 10] It is the regenerative apparatus of the optical recording medium which has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or the pit in which read is possible in the thickness direction, and divided into the key information for determining the decryption approach of the main data which enciphered and generated said digital signal data, and this main data, and divided and recorded said main data and said key information on said different information recording surface,

The regenerative apparatus of the optical recording medium which reads said main data recorded on said different information recording surface from said key information after reading said key information and determining the decryption approach, and is characterized by restoring said main data to the original digital signal data, and reproducing based on the determined decryption approach.

[Claim 11] It has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction. While dividing into the key information for determining the decryption approach of the main data which enciphered and generated said digital signal data, and this main data and dividing and recording said main data and said key information on said different information recording surface It is the regenerative apparatus of the optical recording medium recorded by refreshable signal aspect with 2nd playback means by which the 1st playback means to reproduce differ said main data in said key information,

The regenerative apparatus of the optical recording medium characterized by reading said main data recorded on said different information recording surface from said key information with said 1st playback means, restoring said main data to the original digital signal data, and reproducing based on the determined decryption approach after reading said key information with said 2nd playback means and determining the decryption approach.

[Procedure amendment 3]

[Document to be Amended] Description

[Item(s) to be Amended] 0001

[Method of Amendment] Modification

[Proposed Amendment]

[0001]

[Field of the Invention] This invention relates to the regenerative apparatus of the digital signal data-logging approach to the optical recording medium and optical recording medium which the recorded information cannot copy to other media easily, and a record medium.

[Procedure amendment 4]

[Document to be Amended] Description

[Item(s) to be Amended] 0007

[Method of Amendment] Modification

[Proposed Amendment]

[0007]

[Means for Solving the Problem] This invention is made in view of the above-mentioned technical problem. The 1st invention In the optical recording medium which has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction The digital signal data showing the information for one are divided or more into two in a unit smaller than the amount of data recordable on the 1st page of said information recording surface. It is the optical recording medium characterized by what this divided digital signal data divided and recorded on said different information recording surface of the 2nd [or more] page as becoming discontinuous on said information recording surface. Moreover, the 2nd invention is set to the optical recording medium which has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction. It is the optical recording medium characterized by having divided into the key information for determining the decryption approach of the main data which enciphered and generated said digital signal data, and this main data, and dividing and recording said main data and said key information on said different information recording surface of the 2nd [or more] page. Moreover, the 3rd invention is an optical recording medium characterized by the above-mentioned thing for which said key information was recorded on the lead-in groove field of one of said information recording surfaces in the optical recording medium of the 2nd invention. Moreover, in the optical recording medium of the 2nd which described the 4th invention above, or the 3rd invention, it is the optical recording medium characterized by said key information recording the 1st playback means which reproduces said main data by signal aspect refreshable with the 2nd different playback means. Moreover, the 5th invention is set to the digital signal data-logging approach to the optical recording medium which has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction. The digital signal data showing the information for one are divided or more into two in a unit smaller than the amount of data recordable on the 1st page of said information recording surface. It is the digital signal data-logging approach to the optical recording medium characterized by what this divided digital signal data divides and records on said different information recording surface of the 2nd [or more] page as becoming discontinuous on said information recording surface. Moreover, the 6th invention is set to the digital signal data-logging approach to the optical recording medium which has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction. It divides into the key information for determining the decryption approach of the main data which enciphered and generated said digital signal data, and this main data. It is the digital signal data-logging

approach to the optical recording medium characterized by dividing and recording said main data and said key information on said different information recording surface of the 2nd [or more] page. Moreover, the 7th invention is the digital signal data-logging approach to the optical recording medium characterized by the above-mentioned thing for which said key information is recorded on the lead-in groove field of one of said information recording surfaces in the digital signal data-logging approach to the optical recording medium of the 6th invention. Moreover, in the 6th which described the 8th invention above, or the digital signal data-logging approach to the optical recording medium of the 7th invention, it is the digital signal data-logging approach to the optical recording medium characterized by said key information recording the 1st playback means which reproduces said main data by signal aspect refreshable with the 2nd different playback means. Moreover, the 9th invention has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction. And the digital signal data showing the information for one are divided or more into two in a unit smaller than the amount of data recordable on the 1st page of said information recording surface. It is the regenerative apparatus of the optical recording medium which recorded the record positional information of said digital signal data divided and recorded while this divided digital signal data divided and recorded becoming discontinuous on said different information recording surface of the 2nd [or more] page on said information recording surface on the location defined beforehand. It is the regenerative apparatus of the optical recording medium characterized by reading said digital signal data divided and recorded on said different information recording surface of the 2nd [or more] page according to said record positional information, restoring to the original digital signal data, and reproducing. Moreover, the 10th invention has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction. And it divides into the key information for determining the decryption approach of the main data which enciphered and generated said digital signal data, and this main data. It is the regenerative apparatus of the optical recording medium which divided and recorded said main data and said key information on said different information recording surface. After reading said key information and determining the decryption approach, said main data recorded on said different information recording surface from said key information are read. It is the regenerative apparatus of the optical recording medium characterized by restoring said main data to the original digital signal data, and reproducing based on the determined decryption approach. Moreover, the 11th invention has the 2nd [or more] page of the information recording surface on which the digital signal data showing information, such as an image, music, and a program, are optically recorded by the record mark or pit in which read is possible in the thickness direction. While dividing into the key information for determining the decryption approach of the main data which enciphered and generated said digital signal data, and this main data and dividing and recording said main data and said key information on said different information

recording surface It is the regenerative apparatus of the optical recording medium recorded by refreshable signal aspect with 2nd playback means by which the 1st playback means to reproduce differ said main data in said key information. After reading said key information with said 2nd playback means and determining the decryption approach, Said key information is the regenerative apparatus of the optical recording medium characterized by reading said main data recorded on said different information recording surface with said 1st playback means, restoring said main data to the original digital signal data, and reproducing based on the determined decryption approach.

[Procedure amendment 5]

[Document to be Amended] Description

[Item(s) to be Amended] 0017

[Method of Amendment] Modification

[Proposed Amendment]

[0017] Next, the 2nd example of this invention is explained. Drawing 5 is drawing for explaining the signal record approach of the 2nd example of this invention. As shown in this drawing, in this example, the point which each of the data A and B which should be recorded is enciphered based on the key information A and B corresponding to each, and is recorded on each information recording surface on an optical disk differs from the above-mentioned optical disk 10. That is, the data which should be recorded are divided and recorded on the main data and key information which were enciphered and generated based on key information. At this time, the key information A on Data A is recorded on the data storage area 1-2 of the 1st information recording surface 1, and the main data B1 which enciphered and generated Data B are recorded on a data storage area 1-1. Moreover, key information B-2 is similarly recorded on the data storage area 2-2 of the 2nd information recording surface 2, and the main data A1 are recorded on a data storage area 2-1. That is, the key information and the main data of the same origin are made not to be recorded on the same information recording surface. As long as it keeps this principle, also in an optical disk which has the 3rd [or more] page of an information recording surface, key information and the main data may be installed in the radius of arbitration that what is necessary is just to arrange to the information recording surface of arbitration. Moreover, it is also possible for neither key information nor the main data to necessarily continue uniformly, for example, to halve key information B-2 to B-2 -1 and B-2 -2, to record the radius of 40.0-40.5mm and key information B-2 -2 for key information B-2 -1 on the radius of 57.5-58.0mm, and to use except [its] as the main data A.

[Procedure amendment 6]

[Document to be Amended] Description

[Item(s) to be Amended] 0026

[Method of Amendment] Modification

[Proposed Amendment]

[0026] Since the key information which makes the decryption approach for decoding the main data which enciphered data, and the main data determine was recorded on a different information

recording surface according to the optical disk of the 2nd example of this invention as explained above, an illegal copy can be prevented like the 1st example of the above.

[Procedure amendment 7]

[Document to be Amended] Description

[Item(s) to be Amended] 0029

[Method of Amendment] Modification

[Proposed Amendment]

[0029] Although the example has been given about the record location of key information above, as for this invention, it is needless to say that it is not limited to these and can combine with the existing disk duplicate prevention technique. Moreover, although above-mentioned explanation explained centering on the optical disk of multilayer structure, of course also in the optical disk of the lamination structure which stuck the substrate in which the information recording surface was formed and constituted it, the partial ROM disk having the part only for playbacks, and a record part, and a rewritable mold optical disk, it can apply.

[Procedure amendment 8]

[Document to be Amended] Description

[Item(s) to be Amended] 0030

[Method of Amendment] Modification

[Proposed Amendment]

[0030]

[Effect of the Invention] As explained above, according to the regenerative apparatus of the digital signal data-logging approach to the optical recording medium of this invention, and an optical recording medium, and an optical recording medium **. The digital signal data showing information for one, such as an image, music, and a program, are divided or more into two in a unit smaller than the amount of data recordable on the 1st page of an information recording surface. Since this divided digital signal data divided and recorded becoming discontinuous on a different information recording surface of the 2nd [or more] page on the information recording surface, effective high anti-copying of secrecy nature can be performed without making the cost rise of an optical recording medium almost. Moreover, it divides into the key information for determining the decryption approach of the main data which enciphered and generated the digital signal data showing information for one, such as **, image, music, and a program, and this main data, and since this main data and key information were divided, recorded and made into a different information recording surface, the effective high anti-copying of secrecy nature can perform, without making the cost rise of an optical recording medium almost.